Cryptosporidiosis

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify sources of major public health concern (e.g., a public water supply or swimming pool) and to stop further transmission.
2. To identify whether the case may be a source of infection for other persons (e.g., a child care attendee or food handler), and if so, to prevent further transmission.

B. Legal Reporting Requirements

1. Health care providers: notifiable to local health jurisdiction within 3 work days
2. Hospitals: notifiable to local health jurisdiction within 3 work days
3. Laboratories: notifiable to local health jurisdiction within 2 work days
4. Local health jurisdiction: notifiable to the Washington State Department of Health Communicable Disease Epidemiology Section (CDES) within 7 days of case investigation completion or summary information required within 21 days

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin investigation within 3 working days.
2. Investigate all reported cases of cryptosporidiosis. Administer appropriate infection control recommendations.
3. Report all *confirmed* and *probable* cases to CDES. Beginning January 1, 2009, asymptomatic cases are not reportable. Complete the standard cryptosporidiosis case report form available at: www.doh.wa.gov/notify/forms/crypto.doc and enter the data into the Public Health Issues Management System (PHIMS).

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Cryptosporidiosis is an infection with a protozoan parasite in the genus *Cryptosporidium.* Most human illness is caused by two species: *C. hominis* which only infects humans and C. *parvum* which infects humans, cattle and other mammals. Other species in the genus *Cryptosporidium* rarely infect humans. From an epidemiological and clinical perspective, *C. parvum* and *C. hominis* infections are generally indistinguishable, aside from the fact that the former are more likely to be cattle-related. These two species are rarely distinguished in the laboratory.

Infected animals and people can excrete large numbers of oocysts in stool (10^8 to 10^9 per bowel movement). Oocysts are immediately infective to other susceptible hosts. The infectious dose can be very low (less than 100). Oocysts are relatively hardy in the environment, and in the right conditions can survive for weeks or months. They are resistant to the typical concentrations of chlorine and other disinfectants commonly used for water treatment. They can be killed by heat (e.g., bringing water to a rolling boil),

removed by adequate filtration, or inactivated by *prolonged* disinfection processes that in practice may be difficult to achieve. For example, CDC recently increased their estimate for free chlorine contact time [CT] to kill *Cryptosporidium* species from 9600 to 15,300 mg-min/L—compared to 45 for *Giardia* or 1 for *Escherichia coli* O157 (MMWR 2008;57(06):151–2). Practically, that means that a pool contaminated with *Cryptosporidium* species may need to be closed for days, or in some cases drained and refilled.

B. Description of Illness

Persons with symptoms generally experience mild to severe diarrhea, sometimes watery, usually accompanied by moderate to severe abdominal cramps. Nausea, vomiting, and low-grade fever are common. Illness can be intermittent and prolonged, lasting days to weeks in many patients; over a month in some. Infection can be severe and persistent in persons who are immunocompromised (e.g., chemotherapy, untreated AIDS). Asymptomatic infections can also occur.

Cryptosporidiosis is underdiagnosed, in part because this parasite is rarely identified on a routine stool exam for parasites (O&P). Shedding may be intermittent, and, more importantly, special laboratory methods are usually required for detection. Thus, stool exams reported as negative for *Cryptosporidium* should be interpreted with caution, particularly if there was no specific request for *Cryptosporidium* testing.

C. Cryptosporidiosis in Washington State

Since cryptosporidiois became reportable in Washington in 2000, the number of reported cases has increased from 65 in 2000 to 139 in 2007. Outbreaks of cryptosporidiosis in Washington have been associated with small commercial water systems and wells.

D. Reservoirs

A wide variety of mammals are hosts for this parasite, which is shed in feces. Young livestock, notably calves and lambs, are commonly infected and may excrete huge numbers of oocysts. While many wild animals are infected with various species of *Cryptosporidium*, their importance as a source of human infection is not clear.

E. Modes of Transmission

Transmission is fecal-oral. Most recognized outbreaks to date have been waterborne. Risk factors for infection include:

1. Contact with infected persons (i.e., those in the same household or child care) or infected animals (e.g., young livestock)
2. Drinking fecally contaminated and inadequately treated water;
3. Ingesting fecally contaminated recreational water (rivers, lakes, etc.);
4. Eating food contaminated by animals or food handlers (rarely documented); and
5. Certain types of sexual contact (e.g., oral-anal contact).

F. Incubation Period

The incubation period ranges from approximately 2–12 days but is typically 5–8 days.

G. Period of Communicability

People are communicable as long as oocysts are being shed which is typically days to weeks. Shedding may persist after symptoms resolve, although the concentration of oocysts (and hence infectivity) soon declines.

H. Treatment

Nitazoxanide is approved by the FDA for treatment of diarrhea caused by *Cryptosporidium* species in people ≥ 1 year old with healthy immune systems.

For additional information regarding nitazoxanide, see:
http://www.cdc.gov/crypto/factsheets/tx.html

3. CASE DEFINITION

A. Clinical description

An illness characterized by watery diarrhea, abdominal cramps, loss of appetite, low-grade fever, nausea and vomiting. The disease can be prolonged and life-threatening in severely immunocompromised persons.

B. Laboratory criteria for diagnosis

Laboratory-confirmed cryptosporidiosis shall be defined as the detection of a member of the genus *Cryptosporidium* by one of the following methods:

- Organisms in stool, intestinal fluid, tissue samples or biopsy specimens; or
- Antigens in stool or intestinal fluid; or
- Nucleic acid by PCR in stool, intestinal fluid, tissue samples or biopsy specimens.

C. Case classification (2009)

Probable: a case that meets the clinical description and that is epidemiologically linked to a confirmed case.

Confirmed: a case that meets the clinical description and at least one of the criteria for laboratory-confirmation as described above. When available, species designation and molecular characterization should be reported.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

The diagnosis of cryptosporidiosis is commonly made by detection of the 4–6 micron oocysts in stool using special stains. Since *Cryptosporidium* oocysts are rarely detected by routine O & P (ova and parasite) stool examination, health care providers considering the diagnosis of *Cryptosporidium* infection should alert the laboratory so that specific staining procedures can be performed. Enzyme immunoassays (EIA) are also commonly used to diagnosis *Cryptosporidium.* Polymerase chain reaction (PCR) is not generally used for diagnostic purposes but can be used to determine the species.

B. Tests Available at DOH Public Health Laboratories (PHL)

PHL identifies *Cryptosporidium* oocysts in stool using a direct fluorescent antibody

(DFA) test. If *Cryptosporidium* is suspected, PHL should be notified so that appropriate techniques can be used. Consult with Communicable Disease Epidemiology Section prior to submitting specimens

C. Specimen Collection

To maximize the likelihood of detecting *Cryptosporidium*, three stool specimens should be collected 48 hours apart or over a 10-day period. Stool should be stored and transported either in Para Pac ULTRA ECOFIX™ or in one tube with 10% formalin and one tube with PVA. If the ECOFIX™ kit is being used, stool should be added to the collection kit until the fluid level reaches the red line marked on the outside of the tube. The kit should then be mixed and shipped at room temperature.

Specimens need to be shipped with a completed microbiology form (http://www.doh.wa.gov/EHSPHL/PHL/Forms/Microbiology.pdf).

5. ROUTINE CASE INVESTIGATION

Interview the case and others who may be able to provide pertinent information.

A. Evaluate the Diagnosis

Review the clinical presentation and laboratory results. Beginning January 1, 2009, reports of asymptomatic persons do not require an investigation.

B. Identify Source of Infection

Ask about possible exposures in the 2 to 12 days before onset, including:

1. Contact with any acquaintances or household member with a similar illness (anyone meeting the probable case definition should be reported and investigated in the same manner as a confirmed case);
2. Attendance or work at a child care facility by the case or a household member;
3. Source(s) of drinking water, including water at home and work, as well as streams, lakes or other untreated sources;
4. Recreational water exposures: lakes, rivers, swimming pools, water slides, etc.;
5. Travel outside the area;
6. Contact with livestock and other animals;
7. Consumption of high-risk foods (e.g., raw milk or raw milk products);
8. Other high-risk exposures as detailed in the routine questionnaire.

C. Identify Potentially Exposed Persons

Collect the name, age, and phone number of contacts with a similar illness. These people should be investigated as probable cases.

D. Environmental Evaluation

Conduct any appropriate environmental interventions such as child care inspections or evaluation of drinking water supplies.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

1. Hospitalized patients should be cared for using standard precautions. In addition, contact precautions should be used for diapered or incontinent persons for the duration of illness or to control institutional outbreaks.
2. The case should be educated regarding modes of transmission and ways to prevent transmission to others. Cases should:
   a. Practice good personal hygiene, including effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. The importance of proper hygiene must be stressed, as excretion of the organism may persist for several weeks. Alcohol-based hand sanitizers are NOT effective against *Cryptosporidium*.
   b. Not enter public recreational water (e.g., pools, fountains, lakes) until 2 weeks after resolution of diarrhea.
   c. Avoid sexual practices that might result in oral exposure to stool (e.g., oral-anal contact).
   d. While symptomatic with diarrhea, avoid close contact with anyone who has a weakened immune system.
3. School Restrictions: Children should not attend school as long as they have diarrhea.
4. Work or Child Care Restrictions: Persons should not work as food handlers, child care or health care workers, or attend child care as long as they have diarrhea. Restrictions can be waived or modified at the discretion of the local health jurisdiction.
5. If a suspected source of infection is identified and has the potential for transmitting infection to a defined population (e.g., contaminated well, infected animal), advise those individuals on measures to avoid exposure.

B. Contact Management

A symptomatic contact who meets the probable case definition should be investigated as a case.

C. Environmental Measures

An environmental evaluation is appropriate if an ongoing source of exposure is identified, such as a recreational water venue or drinking water system. Given that *Cryptosporidium* oocysts are resistant to chlorine, alternative sterilization methods are required for disinfecting pools, drinking water, and environmental surfaces.

If an animal venue such as a petting zoo is suspected, consult the Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5605a1.htm.

7. MANAGING SPECIAL SITUATIONS

A. Case Attends or Works at a Child Care Facility

1. Exclude persons with cryptosporidiosis until the diarrhea has resolved.

2. If the center cares for diapered children, interview the operator and inspect attendance records to identify suspect cases among other children or staff during the preceding month.
3. If an outbreak is suspected, collect stool specimens for examination from all symptomatic staff members, attendees, and family members who have a diarrheal illness consistent with cryptosporidioisis.
4. Exclude all symptomatic persons from the child care until diarrhea resolves. Testing and exclusion of asymptomatic carriers, even in the setting of a child care outbreak, is generally not recommended.
5. Instruct the operator and staff about proper food handling and hand washing after diaper changing or bathroom use, and the importance of keeping diaper changing areas away from food preparation areas. Alcohol gels and hand sanitizers do not kill *Cryptosporidium*.
6. Instruct the operator regarding environmental sanitation, particularly in diaper changing areas. No disinfectant is guaranteed to be completely effective against *Cryptosporidium*. However, hydrogen peroxide is more effective than standard bleach solutions.
7. Instruct the child care operator to call the local health jurisdiction immediately if new cases of diarrhea occur. The facility should be called or visited once each week for 6 weeks after onset of the last case to verify that surveillance and appropriate preventive measures are being carried out. Newly symptomatic children should be managed as outlined above.

   For additional information, see: http://www.cdc.gov/crypto/daycare.html

B. Contaminated Swimming Pools

Fecal accidents in pools are a fact of life that pose risk to other bathers. However, the loose fecal matter oozing out from the diaper of a toddler with an infection is an even greater risk to others and is much less likely to be detected than visible formed stool. There are general guidelines for dealing with generic "stool-in-pool" events. Pool contamination from someone known to have cryptosporidiosis is unlikely to show up outside the context of an outbreak investigation.

For additional information regarding responding to fecal accidents in pools, see: http://www.cdc.gov/healthyswimming/pdf/fecal_accident_response_recommendations_for_pool_staff.pdf

C. Reported Incidence Is Significantly Higher than Usual

If the number of reported cases in your jurisdiction is higher than usual for the time of year, or you note possible epidemiological connections, consider the possibility of common-source outbreaks involving recreational or drinking water, raw milk, or live-stock contact. Consult with Communicable Disease Epidemiology Section.

8. ROUTINE PREVENTION

A. Immunization Recommendations: None

B. Prevention Recommendations

1. **Practice good hygiene.**

   a. Wash hands thoroughly with soap and water after using the toilet, before handling or eating food, after changing a diaper or assisting with toileting, after touching something that could be contaminated (such as a trash can, cleaning cloth, drain, or soil), and after handling animals or their toys, leashes, or feces.

   b. Assist or visually supervise young children and other people you are caring for with hand washing as needed.

   c. Shower with soap and water before entering recreational water. Wash thoroughly, especially rectal and genital areas, with soap and water before entering swimming water, water parks, or other public bathing areas.

   d. Wash hands thoroughly after contact with animals, particularly young livestock or animals with diarrhea.

   e. Keep *Cryptosporidium* organisms and other germs out of pools, hot tubs, lakes, rivers, the ocean, etc. by taking the following steps:

      - Protect others by not swimming if you are experiencing diarrhea and for 2 weeks after your diarrhea stops. This is essential for children in diapers.
      - Take children on frequent bathroom breaks or check their diapers often.
      - Change diapers in the bathroom or a diaper-changing area.

2. **Avoid water that might be contaminated.**

   a. Do not drink untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.

   b. Do not drink untreated water or use ice made from untreated water during community-wide outbreaks of disease caused by contaminated drinking water.

   c. Do not swallow recreational water. For more information on recreational water-related illness, visit CDC's Health Swimming website (http://www.cdc.gov/healthyswimming/).

   d. Do not drink untreated water or use ice made from untreated drinking water in countries where the water supply might be unsafe. For information on traveler's health and cryptosporidiosis, visit CDC's Yellow Book.

   e. Obtain recommendations on safe drinking water sources if severe flooding occurs. Shallow private well in flooded areas may need to be checked before use.

3. **If you are unable to avoid using or drinking water that might be contaminated, then you can make the water safer to drink by doing one of the following:**

   a. Heat the water to a rolling boil for at least 1 minute (at altitudes greater than 6,562 feet [>2,000 meters], boil water for 3 minutes).
   OR

   b. Use a filter that has an absolute pore size of 1 micron or smaller, or one that has been NSF rated for "cyst removal." For information on choosing a water filter, see CDC's Fact Sheet A Guide to Water Filters (http://www.cdc.gov/crypto/factsheets/filters.html).

   c. Chemical treatments are often not effective for preventing cryptosporidiosis and are not recommended.

4. **Avoid food that might be contaminated.**

   a. Use safe, uncontaminated water to wash all food that is to be eaten raw.

   b. Wash and/or peel all raw vegetables and fruits before eating.

   c. Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.

5. **Avoid fecal exposure during sexual activity. This is especially important while experiencing diarrhea caused by cryptosporidiosis.**

   a. Use a barrier during oral-anal sex.

   b. Wash hands immediately after handling a condom used during anal sex or after touching the anus or rectal area.

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UPDATES